DOCUMENT RESUME

ED 021 222 48 AL 001 329

By- Reiff, Donald G.; Tikofsky, Ronald S.

APHASIA AND LINGUISTIC COMPETENCE.

Michigan Univ., Ann Arbor. Center for Research on Language and Language Behavior.
Spons Agency- Office of Education (DHEW), Washington, D.C. Bureau of Research.
Bureau No- BR-6-1784
Pub Date 1 Feb 68
Contract- OEC-3-6-061784-0508
Note- 12p.; Report included in Studies in Language and Language Behavior, Progress Report No. VI.
EDRS Price MF-$0.25 HC-$0.56
Descriptors- *APHASIA, CONTRASTIVE LINGUISTICS, *ENGLISH, *GRAMMAR, *LANGUAGE ABILITY, LANGUAGE HANDICAPPED, SENTENCE STRUCTURE
Identifiers- *Competence

The theoretical notions of "grammaticalness" (in terms of sentences of a language) and "competence" (the user's knowledge of grammatical sentences of his language) are tested in one aspect: surface ordering of elements in putative English sentences. This paper reports the results of an initial contrastive experiment, with a sequence of studies to follow. An aphasic individual might be expected to perform differently from a normal individual when asked for judgments of "normality" in putative sentences in his native language. A group of normal subjects and a group of aphasic subjects were asked to: (1) select the one which more closely approximates normal English from a pair of strings of randomly distributed English sentence formatives; (2) rank a given string of randomly distributed formatives on a 1-to-5 scale as to its acceptability as normal English. Results show that both normal and aphasic subjects tend to prefer a given string, regardless of its order in the task, and that rank and preference are highly correlated. Where radical differences were expected, few if any were observed, raising the question of the empirical testability of "linguistic competence," and of its involvement in the behavior of both normal and pathological language users. (Author/JD)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

BR-6-1784
PA-48

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

APHASIA AND LINGUISTIC COMPETENCE[1, 2]

Donald G. Reiff

University of Rochester

and

Ronald S. Tikofsky

Center for Research on Language and Language Behavior
The University of Michigan

The theoretical notions of grammaticalness (in terms of sentences of L) and competence (the user's knowledge of grammatical sentences of his language) are tested in one aspect: surface ordering of elements in putative English sentences. This paper reports the results of an initial contrastive experiment, with a sequence of studies to follow.

An aphasic individual (one having brain damage and concomitant disability in linguistic, or symbolic, ability) might be expected to perform differently from a normal individual, when asked for judgments of "normality" in putative sentences in his native language.

A group of normal subjects and a group of aphasic subjects were asked to carry out the following tasks: (a) select the one which more closely approximates "normal" English from a pair of strings of randomly distributed English sentence formatives; (b) rank a given string of randomly distributed formatives, on a 1-to-5 scale, as to its "acceptability" as normal English. In Task 1 there were 50 pairs; in Task 2, there were 100 strings. Each subject performed the task twice, with reordering of items between sessions.

Results show that both normal and aphasic subjects tend to prefer a given string, regardless of its order in the task; and that rank and preference are highly correlated.

Where one might expect radical differences, one observes few if any; this raises the questions of the empirical testability of "linguistic competence," and of its involvement in the behavior of both normal and pathological language users.

This paper is a preliminary report on the first two steps of a research program designed to develop experimental methods for assessing the linguistic competence of native speakers of a language (in this particular case, American English), both in the standard condition known as normal and in the condition of language deficit, due to brain damage, known as aphasic.

ED021222
AL 001 329

To do this, we examined judgments by native speakers in both these conditions, of the relative "normality" or "well-formedness" of strings of English sentence formatives whose distribution was guaranteed to be uniformly random and which were presented to the subjects as putative English sentences (see Table 1). By using such random distribution and holding other unavoidable constraints constant, we assumed that these strings would be "agrammatical," i.e., they themselves would provide the subjects with no syntactic or lexical information to aid in their interpretation; we further assumed that any interpretations made by the subjects would represent the subjects' knowledge of their language--either a normal native speaker's capability or an aphasic native speaker's deficit.

The stimuli used in the study were 50 pairs of such agrammatical strings. [Items in Table 1 linked by a curved line are members of pairs.] Pairs equal in syntactic length were generated by a computer[3] from 10 grammatical English strings having the form: Det + Adv + Adj + N + S' + V + S' + N + Prep + N.

Two random orders of the 50 pairs were established. In addition, the position of a string within a pair was randomly determined for each pair in each of the two random lists. Each of the random orders was tape-recorded for presentation to the subjects. All strings were spoken on the same normal English declarative sentence intonation contour. A signal recorded on a second channel of the tape stopped the tape player at the end of each pair, while the subject made his choice by pressing an A or B button; when a button was pressed, the tape player continued to the next pair. In this way, the subjects were presented with a forced-choice preference task.

Subjects were told that they would hear pairs of "sentences" which would probably seem bizarre; they could take as long as they wished to respond; and that after they responded in each case, they would hear the next pair.

Choices and latencies were automatically recorded by a PDP-4 computer; data were transferred to punched cards, and the statistical analyses were performed on an IBM 7090 computer of The University of Michigan's Executive System.

The data in Tables 1 and 2 represent the responses of 28 normals (university students) and of 10 aphasic patients. The consistency scores represent the responses of the same 10 aphasic patients and another population of 40 normals.

Insert Tables 1 and 2 about here

Each group of subjects was divided randomly into two groups and tested individually on two different days with two different orderings of the stimuli. There was a no-test day between Days 1 and 2.

Table 1 shows the number of times a member of a pair was selected by subjects for each order of presentation on each experimental day.

Among the artifacts that may confound these results is the possibility that subjects may consistently prefer one button; another is the possibility that they may prefer the same string consistently on both experimental days. Our figures suggest that on the whole, regardless of its position within its pair or of the position of the pair in the total sequence of stimuli, it is the string itself which determines the choice.

If we examine the data in Table 1, we find that there are considerable differences in preference both within populations and between the two (normal and aphasic) populations. In some cases, agreement is almost total; in others, there is considerable ambivalence of choice. In general the aphasic subjects exhibit greater ambivalence and less consistency than the normals, which is not surprising. What is of interest is the difference in choices between the two populations.

Table 2 shows the percentage of subjects who preferred one particular string on the preference task, taken over all conditions for all subjects.

In Group D (0 - 24% preference), there are 15 strings for the normals and 6 for the aphasics--a reduction of 60% in this lowest preference group; in Group A (75% or greater preference), there are 19 strings for the normals and 6 for the aphasics--a reduction of 68% in this highest preference group. However, in Group B (50- 74% preference), we find 30 strings for the normals and 44 for the aphasics--an increase of 47%; and in Group C (25 - 49% preference), there are 36 strings for the normals and 42 for the aphasics--an increase of 17%. This shows, in terms of population percentages, the greater ambivalence of choice on the part of the aphasics.

In Table 2, starred items are those which appear in a given preference-group for both populations. In Group D (0 - 25% preference), there are three coincident choices--Items 34, 42, and 51. In terms of the total number of aphasic preferences in this group, there is a 50% overlap with the normal choices. In Group A (75% or higher preference), there are four coincident choices--Items 33, 41, 52, and 90--an overlap of 67% (in terms of the total

preferences for aphasics in this group). In Groups B and C (50 - 74% and 25 - 49% respectively), the overlaps, respectively, are 16[4] and 18[5]--36% and 43% respectively.

Interpretation of Data

The interpretation of these data prompts a number of reflections about the linguistic competence of normals and aphasics. All of these may serve to generate further research along these lines.

Normals. The relatively stable and consistent performance of the normals immediately suggests the following possibilities.

It may be assumed that when a subject makes the response "closer to normal" to a given string, or putative sentence, he is contributing criteria of judgment which represent his own (learned) abilities to interpret and respond to strings of formatives in his language. This is insured by the method in which the stimulus materials were constructed: all surface syntactic constraints were removed.

The response "closer to normal," behaviorally, may result from one or both of two possible properties of the subject: (a) one string possesses, for him, a greater degree of situational adequacy than the other, i.e., it is semantically closer to normal English; or (b) in the absence of this condition, the preferred string possesses a greater degree of grammatical adequacy than the nonpreferred string, i.e., it is formally closer to normal English.

However, since interpretations like these are basically competence-considerations, they must retain the status of hypotheses and await further refinement of our understanding, both of language and of language use. And since the act of interpretation itself is a performance-consideration, having all the typical constraints of performance, e.g., limited memory, limited time, experience, history, etc., we must say that our data are performance data and their configurations are performance configurations. In this way, it may be concluded that when an individual states that he prefers one string to another, he is in effect stating that either (a) he has previously responded to the string elsewhere, or to one similar to it, regardless of its degree or type of deviance; or (b) if this is not true, then the preferred string is more "adjustable," or interpretable than others via projections made on it from the subject's normal linguistic repertoire. What cannot be shown by these data are theoretically-expressible properties of strings whose analogues are not within the individual subjects' repertoires.

Another question which lies within the domain of performance criteria is the following: does the subject express preference for a string on the basis of only a part of it? At least, in one sense, there is a possibility that given two nonsensical, agrammatical strings, the one which possesses even the slightest suggestion of "normality," as opposed to the other, will be chosen, since the choice is forced. For example, consider the following pairs:

5) Meal sand soldier wine after the
6) Show rice wine daughters delicious home

English categorial relations determine that the only reasonable projection on the first string for normality of element-ordering is on the substring after the. The remaining elements can be treated as a list. However, in the second string there are many features of normal English structure, and perhaps also features of a given subject's experience which might be projected upon the string. First, in terms of an individual's experience, the string might appear to have "telegraphic" form, i.e., determiners have been deleted for economy. On the other hand, it resembles in its syntactic shape either an imperative or an infinitive construct--something similar, say, to:

6a) Show high society women beautiful jewelry

The relations between show--home, or show--daughters--home are perfectly normal sequences which can occur in a number of fully adequate English sentences. The sequence rice wine is normal. Further, though grammatical relations are obscure, the collocation of wine--delicious is common.

Finally, in statement 5, the only possible collocations of semantic items might involve meal--wine--after--the, or possibly meal--soldier--wine--after--the; however, their ordering is far from normal, and this particular ordering would not appear in normal English even under the most complex of transformational relations.

This interpretation is not intended to explain the fact that the second string was preferred to the first by more than 75% of the subjects. Rather, it serves to suggest that this statement appears to accommodate more projections by the subject from a grammatical pattern that he doubtless knows. In addition, it exhibits a larger number of compatible semantic notions or situational responses; and it has more parts which, to the exclusion of the rest of the string, are either fully normal or closer to normal than anything found in the first statement.

Even on the basis of a preliminary analysis of the data it seems reasonable to argue that native speakers of a language do impose interpretations upon random strings of formatives in their language. Further, such interpretations are made even when it is known that there are no constraints whatsoever within the strings themselves, i.e., even when the "sender" is encoding no message, the "receiver" does not receive a nonmessage, but rather attempts to reconstruct some sort of message. This reconstruction is performed on levels that can only be called quite abstract--syntax, lexicon, meaning.

Recent claims, on the theoretical side, that an organism acquires a grammar and that at some point in its history it can then interpret--or impose interpretations upon--any sentence in the language whose grammar has been internalized, appear to be supported at least in part by the results of this study for the normals at least. Most significant is the fact that the subjects were not trained to the experimental task, nor were they previously conditioned to some notion of "acceptability" (which in terms of the goals here would simply beg the question: how does the experimenter know what is "acceptable?"), nor was there any pattern in the stimulus materials which they might have come to respond to during the experimental sessions. In short, what has been experimentally demonstrated is something contributed by the individual to putative linguistic materials which contributed nothing in themselves. If the normal subjects' choices are considered as dependent variables, then we have shown only that there are indeed independent variables controlling the choices. The extent, nature, and function of these variables requires further research.

Aphasics. The less stable performance of the aphasics raises more questions. Clearly, their response-configurations were different from those of the normals, as was to be expected. But the nature of the differences, in terms of the linguistic properties of the presented strings, remains yet to be studied.

There were fewer sentences in Group D (0 - 24% preference) for the aphasics than for the normals; are the aphasics more tolerant of deviance than the normals? Probably not, since they also placed fewer sentences in Group A (75% or higher preference). Are the aphasics then simply less discriminating in general than the normals? Possibly, and we can now proceed to examine experimentally the precise areas of difference in discrimination between aphasics and normals.

On the whole the aphasics were less stable in their consistency of judgment. If the test were given repeatedly to the same group, how would their consistency change? Would the change, if any, be a random sort of change, or would it approach

the normals' consistency to some predictable degree? Further, would their coincidences in judgment with the normals change? And would that change be random or would it approach a greater degree of coincidence with the normals?

Another question arises for the experimental procedure itself: what are the differences in latency between the two groups? What would be the result if both groups were allowed to repeat the stimulus items until they arrived at a decision?

A prime question regarding the total etiology of the aphasic's condition is: how might these results, with their linguistic configurations known in detail, correlate with what is known about the individual neurologically and clinically? In terms of the linguistic properties involved, is the aphasic's disorder qualitative, or is it quantitative, when perseveration effects, etc., are corrected?

The linguist's task now is to determine in detail the syntactic and lexical properties of the strings. An extremely informal count of possible constituents and possible collocation of Groups A through D, for the normals only, yielded a count in the neighborhood of 70 in Group D and something in excess of 300 in Group A. A slightly more sophisticated computer program could yield this information automatically.

Finally, the agrammatical strings used in this study were presented in the receptive/auditory modality only. How would normals and aphasics compare on a repetition task? On a paraphrase task? On a dictation task, in which they are asked to transcribe the strings as they hear them? How would the results compare if the strings were presented visually, or presented in combined auditory and visual modalities?

The methods described here appear to offer one productive approach to research on these questions.

Footnotes

[1]Presented at the Tenth International Congress of Linguists, August 28-September 2, 1967 in Bucharest, Romania.

[2]The research reported herein was performed in part pursuant to Contract OEC-3-6-061784-0508 with the U. S. Department of Health, Education, and Welfare, Office of Education, under the provisions of P. L. 83-531, Cooperative Research, and the provisions of Title VI, P. L. 85-864, as amended. This research report is one of several which have been submitted to the Office of Education as Studies in language and language behavior, Progress Report VI, February 1, 1968.

[3]The authors express their gratitude to Professor B. Galler for his assistance in the preparation of the algorithm which generated the stimulus items.

[4]Items 1, 10, 24, 26, 38, 59, 64, 66, 72, 75, 80, 84, 88, 92, 95, and 100.

[5]Items 9, 11, 19, 23, 25, 30, 37, 63, 65, 71, 74, 76, 79, 83, 87, 91, 96, and 99.

Table 1

Number of Times a Member of a Pair Selected by Subjects

for Days and Orders and for Orders Across Days

No.	String	Normals[1]						Aphasics[2]					
		D_1O_1	D_1O_2	D_2O_2	D_2O_1	Sum O_1	Sum O_1	D_1O_1	D_1O_2	D_2O_2	D_2O_1	Sum O_1	Sum O_2
(1.	Fews make home book old professors man.	6	10	10	9	15	20	2	4	4	1	3	8
(2.	With drink the young knowledge primarily especially amongs.	8	4	4	5	13	8	3	1	1	4	7	2
(3.	Whiskeys straws wine makes daughters.	7	4	1	2	9	5	0	3	3	5	5	6
(4.	Young young buildings grow less hole milk.	7	10	13	12	19	23	5	2	2	0	5	4
(5.	Meal sand soldier wine after the.	2	2	1	7	9	3	2	4	3	2	4	7
(6.	Show rice wine daughters delicious homes.	12	12	13	7	19	23	3	1	2	3	6	3
(7.	New show these extremely.	12	11	11	10	22	22	3	4	3	4	7	7
(8.	Rices above a.	2	3	3	4	6	6	2	1	2	1	3	3
9.	Intelligence news good deliciouses many strong.	5	7	5	4	9	12	0	3	2	2	2	5
(10.	Extremely primarily beautiful foods food windows lakes.	9	7	9	10	19	16	5	2	3	3	8	5
(11.	The milk those rice.	4	5	1	4	8	6	3	2	1	3	6	3
(12.	Around milk paint around.	10	9	13	10	20	22	2	3	4	2	4	7
(13.	Around drink machines windows more book the jobs.	12	13	13	10	22	26	2	2	3	2	4	5
(14.	Many especiallys big ugly machineseses.	2	1	1	4	6	2	3	3	2	3	6	5
(15.	Help quiteses extremely windows paint lady sand.	5	5*	9	10	15	14	2	3	0	4	6	3
(16.	During sand paint essentials good man above big.	9	8*	5	4	13	13	3	2	5	1	4	7
(17.	Verys.	7*	4	5	5	12	9	3	5	3	2	5	8
(18.	Make among.	6*	10	9	9	15	19	2	0	2	3	5	2
(19.	Group deliciouses paint some outside.	8	5	8	3	11	13	2	4	0	4	6	4
(20.	Lady sand through grow soldiers.	6	9	6	11	17	15	3	1	5	1	4	6
(21.	Home dishes.	10	9	7	8	18	16	2	2	1	2	4	3
(22.	Eats.	4	5	7	6	10	12	3	3	4	3	6	7
(23.	Food those during woods thoses.	2	3*	5	4	6	8	1	3	2	1	2	5
(24.	Old rice good delicious grow strong eat.	12	10*	9	10	22	19	4	2	3	4	8	5
(25.	With professors lakes drink.	7	5*	1*	10	17	6	3	1	2	1	4	3
(26.	Seven seven man seven machines view.	7	6*	12*	4	11	18	2	4	3	4	6	7
(27.	Make delicious eats.	10	10	10	12	22	20	3	2	0	2	5	2
(28.	Through prefer few delicious.	4	4	4	2	6	8	2	3	5	3	5	8
(29.	Professors group group.	9	7	12	11	20	19	2	3	1	4	6	4
(30.	Quite dishes meal after.	5	7	2	3	8	9	3	2	4	1	4	6
(31.	Food show.	3	2	5	6	9	7	0	3	0	2	2	3
(32.	Above wine.	11	12	9	8	19	21	4	2	4	3	8	7
(33.	Man grows soldiers among several.	13	11	14	11	24	25	3	5	4	5	8	9
(34.	Help view daughters ins whiskey dishes.	1	3	0	3	4	3	2	0	1	0	2	1
(35.	Home make rices showseses intelligence.	4	6	8	9	13	14	1	4	1	2	3	5
(36.	Quite jobs strong machines very drinks straw help.	10	8	6	5	15	14	4	1	4	3	7	5
(37.	Very with make extremely the windowses.	2	6	8	8	10	14	0	2	2	2	2	4
(38.	Newses very delicious man.	12	8	6	6	18	14	5	3	3	3	8	6
(39.	Grow makes rice.	10	12	11	12	22	23	4	2	3	3	7	5
(40.	Building quite soldiers.	4	2	3	2	6	5	1	3	2	2	3	5
(41.	Especially old.	13	12	14	12	25	26	4	3	4	3	8	7
(42.	Lakeses.	1	2	0	2	3	2	0	2	1	2	2	3
(43.	Rices greens grow view.	6	10	9	9	15	19	2	3	3	1	3	6
(44.	Around above lady like fields lady.	8	4	5	5	13	9	3	2	2	4	7	4
(45.	Book bigs during green prefer jobses.	1	7	2	5	6	9	1	1	0	1	2	1
(46.	Prefers daughters groups the drinks.	13	7	12	9	22	19	4	4	5	4	8	9
(47.	Woods.	12	8	10	6*	18	18	3	2	2	3	6	4
(48.	Machines classes.	2	6	4	7*	9	10	2	3	3	2	4	6
(49.	With outside show classes help.	9	14	13	11	20	27	0	3	1	2	2	4
(50.	Classes machines building intelligence especially.	5	0	1	3	8	1	5	2	4	3	8	6
(51.	Soldier group makeses wood man disheses.	2	5	3	2	4	8	1	2	1	1	2	3
(52.	Simply paint make with these daughters news group.	12	9	11	12	24	20	4	3	4	4	8	7
(53.	Home steel classes.	10	12	13	14	24	25	1	5	0	2	3	5
(54.	Beautifuls extremely.	4	2	1	0	4	3	4	0	5	3	7	5

Table 1 (Continued)

Number of Times a Member of a Pair Selected by Subjects

for Days and Orders and for Orders Across Days

No.	String	Normals[1] D_1O_1	D_1O_2	D_2O_2	D_2O_1	Sum O_1	Sum O_1	Aphasics[2] D_1O_1	D_1O_2	D_2O_2	D_2O_1	Sum O_1	Sum O_1
(55.	This book daughters.	5	9	5	6	11	14	2	5	2	3	5	7
(56.	Lakes new totally.	9	5	9	8	17	14	3	0	3	2	5	3
(57.	Someses like lakes few windows ugly.	13	14	13	14	27	27	3	2	1	4	7	3
(58.	Food strong simplyseseseseses.	1	0	1	0	1	1	2	3	4	1	3	7
(59.	Strong very through grows a jobs very.	8	6	8	9	17	14	3	2	4	1	4	6
(60.	Outside very less sand help less strong ugly.	6	8	6	5	11	14	2	3	1	4	6	4
(61.	The beyond knowledge thoses building seven intelligence.	10	7	8	6	16	15	2	4	0	1	3	4
(62.	Windowses holes arounds help primarily.	4	7	6	8	12	13	3	1	5	4	7	6
(63.	Paint especiallys.	6	7	7	5	11	14	0	2	1	3	3	3
(64.	Essentials dishes jobs.	8	7	7	9	17	14	5	3	4	2	7	7
(65.	After totally.	3	10	4	9	12	14	1	3	2	1	2	5
(66.	Buildings.	11	3	10	5	16	13	4	2	3	4	8	5
67.	Windows intelligences strong soldier seven hole intelligence.	4	4	4	2	6	8.	2	4	3	2	4	7
68.	After some especially help lady daughters new sand.	10	10	10	12	22	20	3	1	2	3	6	3
(69.	Big home.	12	12	13	11	23	25	4	3	2	3	8	5
(70.	Those several.	2	2	1	3	5	3	0	2	3	2	2	5
(71.	Beyond primarily seven fields this.	6	6	8	5	11	14	0	3	4	2	2	7
(72.	Prefer intelligence grow big make.	8	8	6	9	17	14	5	2	1	3	8	3
(73.	View group intelligences.	9	11	12	10	19	23	2	3	4	2	4	7
(74.	Beautifuls young man.	5	3	2	4	9	5	3	2	1	3	6	3
(75.	Especially a sand helps these extremely view the.	4	13	7	7	11	20	2	2	5	4	6	7
(76.	Lesses eat totally thoses with beautiful these.	10	1	7	7	17	8	3	3	0	1	4	3
(77.	Prefer jobs less man.	5*	7	9	6*	11	16	3	1	4	2	5	5
(78.	Green primarily especially wood.	7*	7	5	4*	11	12	2	4	1	3	5	5
(79.	Several rice during book outside hole.	7	7	6	5	12	13	1	3	2	3	4	5
(80.	Quite throughses prefer daughters.	7	7	8	9	16	15	4	2	3	2	6	5
(81.	Help outside whiskey professor good extremelys with.	10	8	7	9	19	15	2	1	0	3	5	1
(82.	More amongs classes windowses above big.	4	6	7	5	9	13	3	4	5	2	5	9
(83.	Steel fields knowledge eat wood.	6	4	3	5	11	7	3	2	1	2	5	3
(84.	In shows seven around.	8	10	11	9	17	21	2	3	4	3	5	7
(85.	Prefer building daughters meal classes withs meal.	12	7	9	11	23	16	1	3	3	2	3	6
(86.	Whiskeys buildingseses jobses daughters.	2	7	5	3	5	12	4	2	2	3	7	4
(87.	Classes beyond with green.	6	7	8	6	12	15	2	2	1	4	6	3
(88.	Machines seven the home.	8	7	6	8	16	13	3	3	4	1	4	7
(89.	Uglys prefer good a these deliciouses	2	4	5	3	5	9	1	1	1	1	2	2
(90.	Few beyond fields simply book after big hole.	12	10	9	11	23	19	4	4	4	4	8	8
(91.	After help machines disheses mores buildings.	9	5	8	5	14	13	1	2	4	2	3	6
(92.	Aboves soldier several group professor foods ugly.	5	9	6	9	14	15	4	3	1	3	7	4
(93.	Group seven simply green.	13	13	12	13	26	25	3	5	3	2	5	8
(94.	Above bigs meal.	1	1	2	1	2	3	2	0	2	3	5	2
(95.	Show after several help professors above.	10	9	7	7	17	16	4	4	2	4	8	6
(96.	Seven preferseses good view.	4	5	7	7	11	12	1	1	3	1	2	4
(97.	Verys.	3	4	1	3	6	5	2	3	1	0	2	4
(98.	With wine.	11	10	13	11	22	23	3	2	4	5	8	6
99.	Several theses prefer eat group simply simply.	7	6	10	4	11	16	2	4	1	1	3	5
(100.	Strong the meal drink during quite classeses.	7	8	4	10	17	12	3	1	4	4	7	5

---

[1] N=14, in each group.

[2] N=5, in each group.

*Entries having a * will not add up to 14 because it was necessary to reject some responses.

Groupings of Subject Preferences by Percentages of Populations

Normals	Aphasics
Group D: 0-24% Preference	
2. With drink the young knowledge primarily especially amongs.	31. Food show.
3. Whiskeys straws wine makes daughters.	*34. Help view daughters ins whiskey dishes.
5. Meal sand soldier wine after the.	*42. Lakeses.
8. Rices above a.	45. Book bigs during green prefer jobses.
14. Many especiallys big ugly machineseses.	*51. Soldier group makeses wood man disheses.
*34. Help view daughters ins whiskey dishes.	89. Uglys prefer good a these deliciouseses.
40. Building quite soldiers.	
*42. Lakeses.	
50. Classes machines building intelligence especially.	
*51. Soldier group makeses wood man disheses.	
54. Beautifuls extremely.	
58. Food strong simplyseseseseses.	
70. Those several.	
94. Above bigs meal.	
97. Verys.	
Group C: 25-49% Preference	
*9. Intelligence news good deliciouses many strong.	2. With drink the young knowledge primarily especially amongs.
*11. The milk those rice.	4. Young young buildings grow less hole milk.
16. Durings sand paint essentials good man above big.	5. Meal sand soldier wine after the.
17. Verys.	6. Show rice wine daughters delicious home.
*19. Group deliciouses paint some outside.	8. Rices above a.
22. Eats.	*9. Intelligence news good deliciouses many strong.
*23. Food those during woods thoses.	*11. The milk those rice.
*25. Withs professors lakes drink.	13. Around drink machines windows more book the jobs.
28. Through prefer few delicious.	18. Make among.
*30. Quite dishes meal after.	*19. Group deliciouses paint some outside.
31. Food show.	20. Lady sand through grow soldiers.
35. Home make rices showseses intelligence.	21. Home dishes.
*37. Very with make extremely the windowses.	*23. Food those during woods thoses.
44. Around above lady like fields lady.	*25. Withs professors lakes drink.
45. Book bigs during green prefer jobses.	27. Make delicious eats.
48. Machines classes.	29. Professors group group.
55. This book daughters.	*30. Quite dishes meal after.
60. Outside very less sand help less strong ugly.	*37. Very with make extremely the windowses.
62. Windowses holes arounds help primarily.	40. Building quite soldiers.
*63. Paint especiallys.	43. Rices greens grow view.
*65. After totally.	47. Woods.
67. Windows intelligences strong soldier seven hole intelligence.	49. With outside show classes help.
*71. Beyond primarily seven fields this.	53. Home steel classes.
*74. Beautifuls young man.	56. Lakes new totally.
*76. Lesses eat totally thoses with beautiful these.	61. The beyond knowledge thoses building seven intelligence.
77. Prefer jobs less man.	*63. Paint especiallys.
78. Green primarily especially wood.	*65. After totally.
*79. Several rice during book outside hole.	68. After some especially help lady daughters new sand.
82. More amongs classes windowses above big.	70. Those several.
*83. Steel fields knowledge eat wood.	*71. Beyond primarily seven fields this.
86. Whiskeys buildingseses jobses daughters.	*74. Beautifuls young man.
*87. Classes beyond with green.	*76. Lesses eat totally thoses with beautiful these.
89. Uglys prefer good a these deliciouseses.	*79. Several rice during book outside hole.
*91. After help machines disheses mores buildings.	81. Help outside whiskey professor good extremelys with.
*96. Seven preferseses good view.	*83. Steel fields knowledge eat wood.
*99. Several theses prefer eat group simply simply.	85. Prefer building daughters meal classes few withs meal.
	*87. Classes beyond with green.
	*91. After help machines disheses mores buildings.
	94. Above bigs meal.
	*96. Seven prefereseses good view.
	97. Verys.
	*99. Several theses prefer eat group simply simply.

* = coincident judgment

OE-BR

Table 2 (Continued)

Groupings of Subject Preferences by Percentages of Populations

Normals

Group B: 50-74% Preference

*1. Fews make home book old professors man.
*10. Extremely primarily beautiful foods food windows lakes.
15. Help quiteses extremely windows paint lady sand.
18. Make among.
20. Lady sand through grow soldiers.
21. Home dishes.
*24. Old rice good delicious grow strong eat.
*26. Seven seven man seven machines view.
29. Professors group group.
32. Above wine.
36. Quite jobs strong machines very drinks straw help.
*38. Newses verys delicious man.
43. Rices greens grow view.
46. Prefers daughters groups the drinks.
47. Woods.
56. Lakes new totally.
*59. Strong very through grows a jobs very.
61. The beyond knowledge thoses building seven intelligence.
*64. Essentials dishes jobs.
*66. Buildings.
*72. Prefer intelligence grow big make.
*75. Especially a sand helps these extremely view the.
*80. Quite throughses prefer daughters.
81. Help outside whiskey professor good extremelys with.
*84. In shows seven around.
85. Prefer building daughters meal classes few withs meal.
*88. Machines seven the home.
*92. Aboves soldier several group professor foods ugly.
*95. Show after several help professors above.
*100. Strong the meal drink during quite classeses.

Aphasics

*1. Fews make home book old professors man.
3. Whiskeys straws wine makes daughters.
5. Meal sand soldier wine after the.
7. New show these extremely.
*10. Extremely primarily beautiful foods food windows lakes.
12. Around milk paint around.
14. Many especiallys big ugly machineseses.
16. Durings sand paint essentials good man above big.
17. Verys.
22. Eats.
*24. Old rice good delicious grow strong eat.
*26. Seven seven man seven machines view.
28. Through prefer few delicious.
*38. Newses verys delicious man.
39. Grow makes rice.
44. Around above lady like fields lady.
48. Machines classes.
50. Classes machines building intelligence especially.
54. Beautifuls extremely.
55. This book daughters.
57. Someses like lakes few windows ugly.
58. Food strong simplyseseseseses.
*59. Strong very through grows a jobs very.
60. Outside very less sand help less strong ugly.
62. Windowses holes arounds help primarily.
*64. Essentials dishes jobs.
*66. Buildings.
67. Windows intelligences strong soldier seven hole intelligence.
69. Big home.
*72. Prefer intelligence grow big make.
73. View group intelligences.
*75. Especially a sand helps these extremely view the.
77. Prefer jobs less man.
78. Green primarily especially wood.
*80. Quite throughses prefer daughters.
82. More amongs classes windowses above big.
*84. In shows seven around.
86. Whiskeys buildingses jobses daughters.
*88. Machines seven the home.
*92. Aboves soldier several group professor foods ugly.
93. Group seven simply green.
*95. Show after several help professors above.
98. With wine.
*100. Strong the meal drink during quite classeses.

Group A: 75% or Higher Preference

4. Young young buildings grow less hole milk.
6. Show rice wine daughters delicious home.
7. New show these extremely.
12. Around milk paint around.
13. Around drink machines windows more book the jobs.
27. Make delicious eats.
*33. Man grows soldiers among several.
39. Grow makes rice.
*41. Especially old.
49. With outside show classes help.
*52. Simply paint make with these daughters news group.
53. Home steel classes.
57. Someses like lakes few windows ugly.
68. After some especially help lady daughters new sand.
69. Big home.
73. View group intelligences.
*90. Few beyond fields simply book after big hole.
93. Group seven simply green.
98. With wine.

32. Above wine.
*33. Man grows soldiers among several.
*41. Especially old.
46. Prefers daughters groups the drinks.
*52. Simply paint make with these daughters news group.
*90. Few beyond fields simply book after big hole.